DETERMINING SUCCESS FOR AFRICAN-AMERICAN TECHNOLOGY VENTURES WITH AGENT-BASED MODELING

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ABSTRACT

- This novel research provides an artificial intelligence based computational modeling and simulation approach to determine causal relations leading to success for African-American technology ventures and entrepreneurship in a social-technical-economic-political (STEP) complex dynamic ecosystem.
- This methodology is called agent-based modeling (ABM) and simulates the organizational behavior of an African-American owned enterprise (AAE) as it interacts with other autonomous decision-making participants or agents: government R&D (G), research universities (R), funding institutes (F), and non-AAEs (N) (AGRFN-ABM).
- Findings based on emergence of aggregate behavior for AAE include government set-aside contracts are significant for success; funding can be offset by high socio-economic status; collaborations can increase funding and competencies but is only short-term for universities; and debt or equity funding create only short-term opportunities.

RESEARCH MOTIVATION

- Counter under-representation of AAEs in Hi-Tech due to low levels of leadership positions and few jobs created in underserved areas.
- Close research gaps in holistic STEP ecosystem approach to addressing AAE under-representation.

AGENT-BASED MODELING

Define Complex Dynamic Ecosystem Framework → Define Agents, Rules, and Model → Modeling: Validate, Calibrate, and Simulations → Outputs, Results & Conclusions for Aggregate Behavior

AUTONOMOUS AGENTS

AGENT ATTRIBUTES & ACTIONS

ENTERPRISE AGENTS (AAE and NON-AAE)

Agent Attributes	Agent Actions
Age	Seek partnerships
Education	Develop a business plan
Race	Collaborate with other enterprises
Personal startup	Compete for funding
R&D investment	Compete for R&D collaboration
Product future	Engage with a research university
Risk tolerance	Seek partnerships
Future of product	
Product maturity	

RESEARCH UNIVERSITY

Agent Attributes	Agent Actions
Partnership history	University collaboration
Provide cutting edge research	Improve enterprise product level
Short-term collaboration	Collaborate with other enterprises
R&D collaboration capacity	

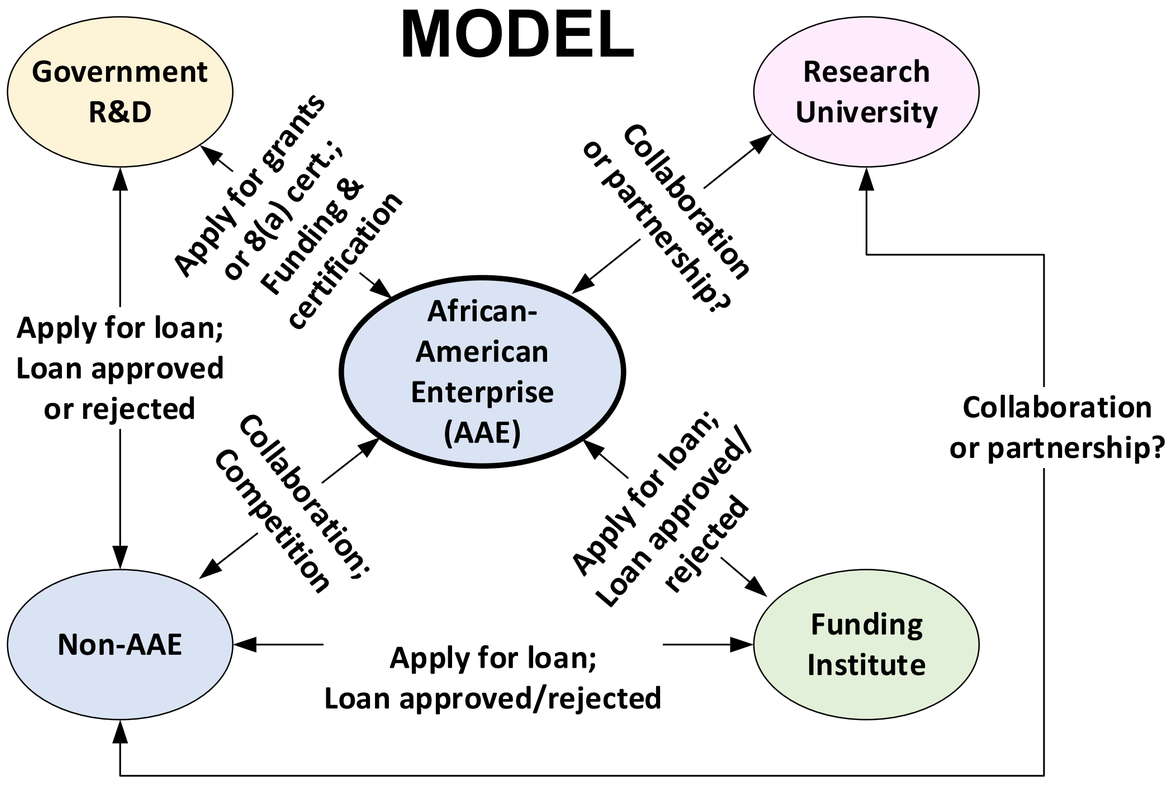
GOVERNMENT R&D

Agent Attributes	Agent Actions
Minority business authority; Sec. 8(a) set-aside	Evaluate enterprises for 8(a)
Government R&D funding	Implement new policies
SBIR grants	

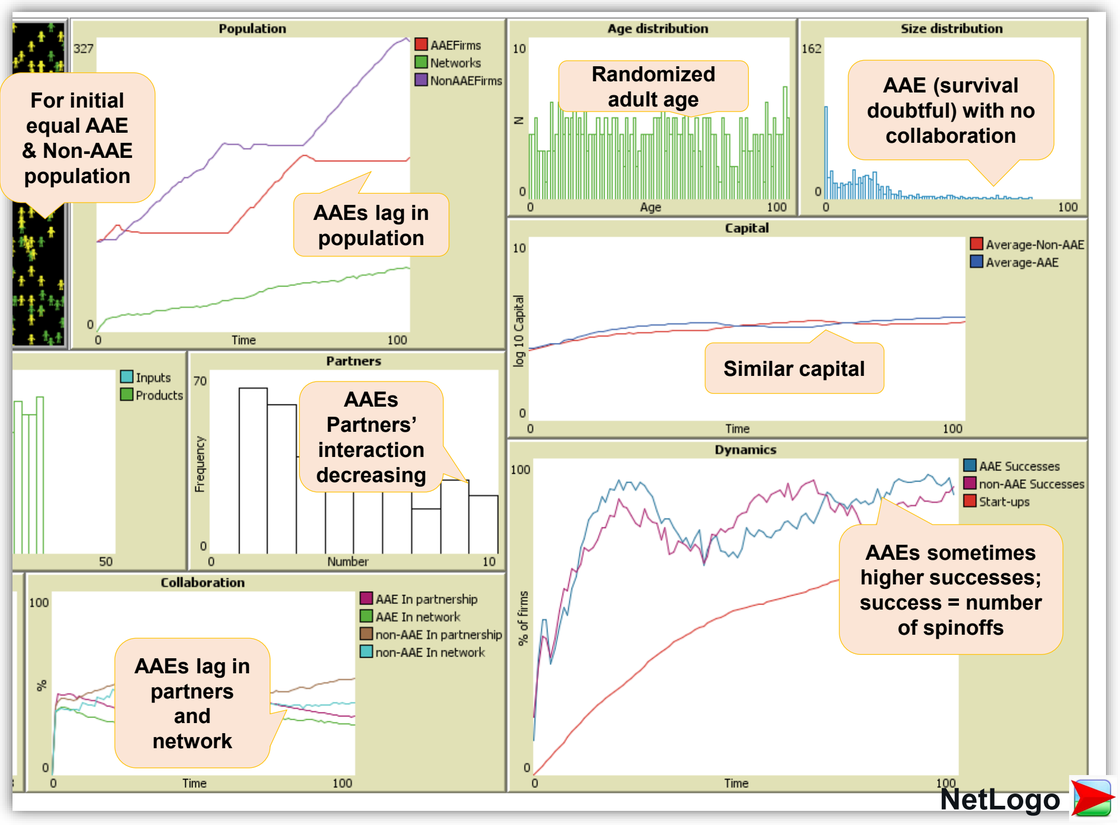
FUNDING INSTITUTE

Agent Attributes	Agent Actions
Loan size	Approve loan
Loan history on race basis	Evaluate business plan
Loan history to startups	Check credit rating
Loan limit to startups	

TECH VENTURE AGENT-BASED MODEL



SAMPLE SIMULATION SCENARIO



CONCLUSION

ABM has high potential for research and policymaking to indicate causal relationships leading to under-representation of African-American enterprises and testing policy alternatives for alleviation of situation factors.

FUTURE RESEARCH

The model will be applied to multiple policy simulation scenarios to improve African-American representation in high-tech industries.